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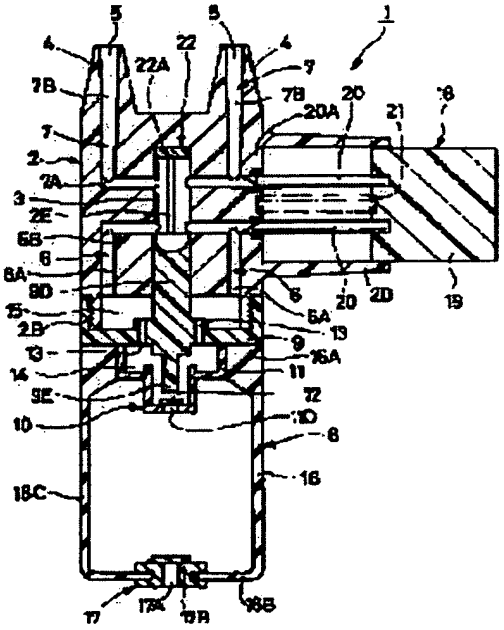
(54) ADMINISTRATOR FOR NASAL CAVITY

(57)Abstract:
PROBLEM TO BE SOLVED: To make it possible to surely dose medicinal powder to a patient in correspondence to the properties of the medicinal powder with an administrator for dosing the patient with the medicinal powder in a capsule by generating turbulence within the capsule by the air supplied from a pumping part and regulating the flow rate of the inflow air.
SOLUTION: Respective inflow side vent paths 6 and outflow side vent paths 7 are formed in the capsule housing hole 3a of an administrator body 2 so as to exist in the direction diametral to the capsule housing hole 3 in such a manner that the air flows into the capsule from the diametral direction. A capsule retainer 9 having an orifice 13 is disposed between the pumping section 16 and the administrate body 2. The inflow air quantity is regulated by the orifice 13 to generate the turbulence to all the corners in the capsule. The medicinal powder is surely diffused by this turbulence, by which the medicinal powder is transported to the patient's nasal cavities.



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CLAIMS

[Claim(s)]

[Claim 1] The body of a medication machine with which the drug powder hold room in which drug powder is held in the middle of shaft orientations was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air to the drug powder hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a drug powder hold room, and is supplied from this pump section from the direction side of a path to the drug powder hold interior of a room, The medication machine for nasal cavities which is formed so that said body of a medication machine may be countered across a drug powder hold room, and comes to constitute the direction side of a path and said each drug powder exhaust nozzle of this drug powder hold room from an outflow side aeration way of the pair which is open for free passage, respectively.

[Claim 2] The body of a medication machine with which the drug powder hold room in which drug powder is held in the middle of shaft orientations was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air to the drug powder hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a drug powder hold room, and is supplied from this pump section from the direction side of a path to the drug powder hold interior of a room, The outflow side aeration way of the pair which is formed so that said body of a medication machine may be countered across a drug powder hold room, and opens the direction side of a path and said each drug powder exhaust nozzle of this drug powder hold room for free passage, respectively, The medication machine for nasal cavities which it comes to constitute from an orifice which regulates the air flow rate which it is prepared between said each inflow side aeration way and pump sections, and is supplied to the drug powder hold interior of a room through an inflow side aeration way from this pump section.

[Claim 3] The body of a medication machine with which the capsule hold room in which the capsule by which it filled up with drug powder in the middle of shaft orientations is held was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a

medication machine in order to supply air in the capsule held in the capsule hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a capsule hold room, and is supplied from this pump section from the direction side of a path to the capsule hold interior of a room, The medication machine for nasal cavities which is formed so that said body of a medication machine may be countered across a capsule hold room, and comes to constitute the direction side of a path and said each drug powder exhaust nozzle of this capsule hold room from an outflow side aeration way of the pair which is open for free passage, respectively.

[Claim 4] The body of a medication machine with which the capsule hold room in which the capsule by which it filled up with drug powder in the middle of shaft orientations is held was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air in the capsule held in the capsule hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a capsule hold room, and is supplied from this pump section from the direction side of a path to the capsule hold interior of a room, The outflow side aeration way of the pair which is formed so that said body of a medication machine may be countered across a capsule hold room, and opens the direction side of a path and said each drug powder exhaust nozzle of this capsule hold room for free passage, respectively, The medication machine for nasal cavities which it comes to constitute from an orifice which regulates the air flow rate which it is prepared between said each inflow side aeration way and pump sections, and is supplied to the capsule hold interior of a room through an inflow side aeration way from this pump section.

[Claim 5] The inflow path formed in the shaft orientations of the body of a medication machine so that opening of said inflow side aeration way might be carried out to the pump section, It constitutes from a pin insertion hole formed in the direction of a path so that it might be open for free passage with this inflow path and opening might be carried out to the side of a capsule hold room. Said outflow side aeration way The pin insertion hole formed in the direction of a path so that opening might be carried out to the side of a capsule hold room, It constitutes from a shaft-orientations path formed in the shaft orientations of the body of a medication machine so that it might be open for free passage with this pin insertion hole and opening might be carried out to a drug powder exhaust nozzle. Said punching implement is a medication machine for nasal cavities according to claim 3 or 4 which it is located in the side of the body of a medication machine, it is inserted in said each pin insertion hole, and comes to constitute from a pin of a movable pair in the direction of a path.

[Claim 6] The medication machine for nasal cavities according to claim 1, 2, 3, 4, or 5 which the jet nozzle of the pair inserted in a nasal cavity protrudes while said outflow side aeration way is

formed in a side besides the shaft orientations of said body of a medication machine, and comes to carry out opening, respectively by using the tip of each of this jet nozzle as said each drug powder exhaust nozzle.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention uses the drug powder held in the drug powder hold interior of a room for medicating a patient, and relates to the suitable medication machine for nasal cavities.

[0002]

[Description of the Prior Art] Generally, the cure which spouts a fine-particles-like chemical in a nasal cavity is adopted as patients, such as nasal allergy. Moreover, in this cure, the capsule by which it filled up with the fine-particles-like chemical is held in the capsule hold interior of a room, using the jet machine of dedication, and the drug powder in this capsule is prescribed for the patient into a nasal cavity.

[0003] Furthermore, as a jet machine used for this cure, what is shown in JP,59-34267,A (henceforth the conventional technique) is known.

[0004] With the jet vessel in this conventional technique, the pump section is prepared in the airstream close side of a cylinder member, the point which formed opening used as a drug powder exhaust nozzle in the tip side of this cylinder member while forming in the airstream appearance side of this cylinder member the concave configuration section in which a capsule is inserted is prepared removable, and the capsule hold section is formed in the interior by fitting a point into this cylinder member. Furthermore, it has the composition of performing punching of the capsule held in capsule hold circles with the needle in this cap, by having the cap which is missing from said cylinder member and point, and fits in removable, forming the needle prolonged in shaft orientations in this cap, and equipping with a cap, where fitting of the point is carried out to said cylinder member.

[0005] Thus, the capsule by which fine-particles-like drug powder was filled up with the conventional technique constituted is inserted in the concave configuration section of a cylinder member. By inserting a point in one of nasal cavities among a patient's left and a right nasal cavity, and pressing the pump section in this condition, after making a hole in the shaft-orientations both sides of this capsule with the needle formed in the cap The air from the pump section spouts the drug powder in a capsule in a patient's nasal cavity from opening. And

the jet machine by the conventional technique prescribes drug powder for the patient by inserting a point in a patient's left and a right nasal cavity by turns, and repeating press actuation of the pump section each time.

[0006]

[Problem(s) to be Solved by the Invention] By the way, the jet machine by the conventional technique makes two holes in the shaft-orientations both sides of a capsule, makes the shaft orientations in a capsule generate airstream through this hole, and spouts the drug powder in this capsule from a drug powder exhaust nozzle by this airstream.

[0007] For this reason, when the physical properties (particle size, specific gravity, fluidity, etc.) of the drug powder in a capsule and the super-[especially] atomized drug powder are used, it cannot be efficiently spread to the air supplied from the pump section, but drug powder remains in a capsule also after medication termination, and this drug powder may be unable to turn drug powder to a patient's nasal cavity enough, and may be unable to be spouted. In such a case, the problem that variation will arise is in the amount of drug powder (henceforth a dose) with which a patient is medicated.

[0008] This invention was made in view of the problem of the conventional technique mentioned above, this invention is efficiently diffused to the air to which the drug powder with which the drug powder hold interior of a room was filled up is supplied, and it aims at offering the medication machine for nasal cavities which enabled it to medicate a patient with the drug powder of the amount of conventions.

[0009]

[Means for Solving the Problem] In order to solve the technical problem mentioned above, the medication machine for nasal cavities which invention of claim 1 adopts The body of a medication machine with which the drug powder hold room in which drug powder is held in the middle of shaft orientations was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air to the drug powder hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a drug powder hold room, and is supplied from this pump section from the direction side of a path to the drug powder hold interior of a room, It is formed so that said body of a medication machine may be countered across a drug powder hold room, and it is in having constituted the direction side of a path and said each drug powder exhaust nozzle of this drug powder hold room from an outflow side aeration way of the pair which is open for free passage, respectively.

[0010] If the pump section is pressed and air is supplied from this pump section by the above-mentioned configuration, this air will flow to a drug powder exhaust nozzle through each inflow side aeration way, a drug powder hold room, and each outflow side aeration way. At this time, the air supplied from the pump section flows from the direction side of a path of a drug powder hold room, and collides in this drug powder hold interior of a room. And the air which the drug powder of the drug powder hold interior of a room was diffused and mixed by this

airstream in air, and contained this drug powder can be spouted towards a patient's nasal cavity through each outflow side aeration way from a drug powder exhaust nozzle.

[0011] The body of a medication machine with which the drug powder hold room in which the medication machine for nasal cavities which invention of claim 2 adopts holds drug powder in the middle of shaft orientations was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air to the drug powder hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a drug powder hold room, and is supplied from this pump section from the direction side of a path to the drug powder hold interior of a room, The outflow side aeration way of the pair which is formed so that said body of a medication machine may be countered across a drug powder hold room, and opens the direction side of a path and said each drug powder exhaust nozzle of this drug powder hold room for free passage, respectively, It is prepared between said each inflow side aeration way and pump sections, and is in having constituted from an orifice which regulates the air flow rate supplied to the drug powder hold interior of a room through an inflow side aeration way from this pump section.

[0012] The air which diffused the drug powder of the drug powder hold interior of a room in air in the drug powder hold interior of a room by the airstream which flows from the pump section to a drug powder exhaust nozzle through each inflow side aeration way, a drug powder hold room, and each outflow side aeration way, and contained this drug powder by the above-mentioned configuration can be spouted towards a patient's nasal cavity through an outflow side aeration way from a drug powder exhaust nozzle. Moreover, since it is regulated by the orifice, the physical properties of drug powder of the air flow rate supplied to the drug powder hold interior of a room through each inflow side aeration way from the pump section (particle size, specific gravity, fluidity, etc.), for example, the specific gravity of drug powder, are light, and when particle size is small, it can diffuse efficiently the drug powder of the drug powder hold interior of a room to inflow air by lessening an inflow air flow rate by the orifice.

[0013] The body of a medication machine with which the capsule hold room in which the medication machine for nasal cavities which invention of claim 3 adopts holds the capsule by which it filled up with drug powder in the middle of shaft orientations was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air in the capsule held in the capsule hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a capsule hold room, and is supplied from this pump section from the direction side of a path to the capsule hold interior of a room, It is formed so that said body of a medication machine may be countered across a capsule hold room, and it is in having constituted the direction side of a path and said each drug powder exhaust nozzle of

this capsule hold room from an outflow side aeration way of the pair which is open for free passage, respectively.

[0014] If the pump section is pressed and air is supplied from this pump section by the above-mentioned configuration, this air will flow to a drug powder exhaust nozzle through each inflow side aeration way, a capsule hold room, and each outflow side aeration way. At this time, the air supplied from the pump section flows from the direction side of a path of the capsule of the capsule hold interior of a room, and collides within this capsule. And the air which the drug powder in a capsule was diffused and mixed by this airstream in air, and contained this drug powder can be spouted towards a patient's nasal cavity through an outflow side aeration way from a drug powder exhaust nozzle.

[0015] The body of a medication machine with which the capsule hold room in which the medication machine for nasal cavities which invention of claim 4 adopts holds the capsule by which it filled up with drug powder in the middle of shaft orientations was prepared, The pump section prepared in the shaft-orientations 1 side of this body of a medication machine in order to supply air in the capsule held in the capsule hold room of this body of a medication machine, The drug powder exhaust nozzle of a pair established in the side besides the shaft orientations of said body of a medication machine in order to blow off drug powder to a nasal cavity, The inflow side aeration way of the pair which supplies the air which is formed so that said body of a medication machine may be countered across a capsule hold room, and is supplied from this pump section from the direction side of a path to the capsule hold interior of a room, The outflow side aeration way of the pair which is formed so that said body of a medication machine may be countered across a capsule hold room, and opens the direction side of a path and said each drug powder exhaust nozzle of this capsule hold room for free passage, respectively, It is prepared between said each inflow side aeration way and pump sections, and is in having constituted from an orifice which regulates the air flow rate supplied to the capsule hold interior of a room through an inflow side aeration way from this pump section.

[0016] The air which the drug powder held in the capsule hold room diffused the drug powder of the drug powder hold interior of a room in air within the restoration ****** capsule by the airstream which flows from the pump section to a drug powder exhaust nozzle through each inflow side aeration way, a capsule hold room, and each outflow side aeration way, and contained this drug powder by the above-mentioned configuration can be spouted towards a patient's nasal cavity through each outflow side aeration way from a drug powder exhaust nozzle. Moreover, since it is regulated by the orifice, the physical properties of drug powder of the air flow rate supplied to the drug powder hold interior of a room through each inflow side aeration way from the pump section (particle size, specific gravity, fluidity, etc.), for example, the specific gravity of drug powder, are light, and when particle size is small, it can diffuse efficiently the drug powder of the drug powder hold interior of a room to inflow air by lessening an inflow air flow rate by the orifice.

[0017] The inflow path formed in the shaft orientations of the body of a medication machine so that said inflow side aeration way might carry out opening of the invention of claim 5 to the pump section, It constitutes from a pin insertion hole formed in the direction of a path so that it

might be open for free passage with this inflow path and opening might be carried out to the side of a capsule hold room. Said outflow side aeration way The pin insertion hole formed in the direction of a path so that opening might be carried out to the side of a capsule hold room, It is in having constituted from a shaft-orientations path formed in the shaft orientations of the body of a medication machine so that it might be open for free passage with this pin insertion hole and opening might be carried out to a drug powder exhaust nozzle, and said punching implement having been located in the side of the body of a medication machine, having been inserted in said each pin insertion hole, and having constituted it from a pin of a movable pair in the direction of a path.

[0018] By the above-mentioned configuration, the pin insertion hole used at the time of punching of a capsule is made into a part of inflow side aeration way and outflow side aeration way, and since this each pin insertion hole is located in the direction of a path to a capsule hold room and is formed, the through hole drilled by the capsule can be made to be able to counter in the direction of a path, and can be formed. And the air which flows in a capsule through each inflow side aeration way can convey the air which can collide within a capsule, could be made to be able to generate a turbulent flow in this capsule, and could be made to diffuse drug powder in air efficiently, and this drug powder diffused through a drug powder exhaust nozzle at a nasal cavity to the pin insertion hole of each outflow side aeration way, a shaft-orientations path, and a pan.

[0019] The jet nozzle of the pair inserted in a nasal cavity having protruded, while said outflow side aeration way was formed in the side besides the shaft orientations of said body of a medication machine, and having carried out opening, respectively by using the tip of each of this jet nozzle as said each drug powder exhaust nozzle has invention of claim 6.

[0020] The air supplied from the pump section by the above-mentioned configuration can flow to a nasal cavity through each inflow side aeration way, a drug powder hold room or a capsule hold room, each outflow side aeration way, and each drug powder exhaust nozzle, and can convey a drug powder hold room or the drug powder of the capsule hold interior of a room to a nasal cavity by this airstream.

[0021]

[Embodiment of the Invention] Hereafter, the gestalt of operation by this invention is explained to a detail according to an accompanying drawing.

[0022] First, the 1st example by this invention is shown in drawing 1 thru/or drawing 9 .

[0023] One shows the medication machine for nasal cavities by this example among drawing, this medication machine 1 for nasal cavities is screwed on the 1 side of the capsule hold hole 3 mentioned later, the jet nozzle 4 which spouts drug powder, the body 2 of a medication machine which has punching implement 18 grade, and this body 2 of a medication machine, and the profile configuration is carried out from the capsule presser foot 9, the supply valve 10, and the pump unit 8 equipped with the pump section 16 grade.

[0024] 2 shows the body of a medication machine. The appearance of this body 2 of a medication machine Major diameter 2A formed in the shape of [short length] a cylinder by the shaft-orientations 1 side, and male screw section 2B formed in the peripheral face of this major

diameter 2A, Rectangle section 2C in which the cross section was formed from nothing, the double width section, and the narrow-width section in the shape of a rectangle towards said major diameter 2A to the side else, In order to extend and protrude on the narrow-width section of this rectangle section 2C, and parallel, to be located in the both-sides side of guide cylinder part 2D which supports the supporter 19 of the punching implement 18 mentioned later movable, and the direction of the double width section of said rectangle section 2C and to move the capsule discharge implement 22 to shaft orientations It consists of slots 2E and 2E formed in said capsule hold hole 3 by penetrating.

[0025] 3 shows a capsule hold hole, and this capsule hold hole 3 is formed as a closed-end hole so that opening may be carried out to the pump-unit 8 side located in the 1 side from the center section of said body 2 of a medication machine. And this capsule hold hole 3 constitutes the capsule hold room by inserting capsule press section 9D of said pump unit 8 from 1 side.

[0026] 4 and 4 are jet nozzles, this each jet nozzle 4 protrudes in the condition of it having been located in the other end side of rectangle section 2C of said body 2 of a medication machine, and having estranged on the left and the right, and opening of each of this jet nozzle 4 serves as the drug powder exhaust nozzle 5.

[0027] Here, said each drug powder exhaust nozzle 5 turns to a nasal cavity the drug powder which flows with air through the outflow side aeration way 7, and spouts.

[0028] 6 and 6 show the inflow side [2] aeration way established in the 1 side of the body 2 of a medication machine. This each close side aeration way 6 The inflow paths 6A and 6A formed in the shaft orientations of the body 2 of a medication machine so that it might be located in the direction periphery side of a path of the capsule hold hole 3 and opening might be carried out to a pump-unit 8 side, It consists of pin insertion holes 6B and 6B formed in the direction side of a path so that it might be open for free passage with this each inflow path 6A and opening might be carried out to the capsule hold hole 3. And each inflow side aeration way 6 supplies the air supplied from the pump section 16 from the direction side of a path of the capsule hold hole 3.

[0029] 7 and 7 show the outflow side [2] aeration way established in the side besides the body 2 of a medication machine. This each outflow side aeration way 7 The pin insertion holes 7A and 7A formed in the direction side of a path so that opening might be carried out to the capsule hold hole 3, It is open for free passage with this pin insertion hole 7A, and consists of outflow paths 7B and 7B used as the shaft-orientations path formed where it was located in the periphery side of the direction of a path of the capsule hold hole 3 and the diameter is expanded towards said drug powder exhaust nozzle 5. And each outflow side aeration way 7 is opening the direction side of a path and each drug powder exhaust nozzle 5 of the capsule hold hole 3 for free passage, respectively.

[0030] 8 shows the pump unit prepared in the 1 side of the body 2 of a medication machine, and this pump unit 8 consists of below-mentioned capsule presser foot 9 screwed on male screw section 2B of the body 2 of a medication machine, a supply valve 10 which fixed to this capsule presser foot 9, and the pump section 16 which fixed on valve element hold section 11 periphery of said capsule presser foot 9, as shown in drawing 3 .

[0031] Major diameter disk section 9A to which 9 is a capsule presser foot and this capsule

presser foot 9 was located in the 1 side, Short length cylinder part 9B formed so that it might be located in the periphery side of this disk section 9A and might extend in the side else, Capsule press section 9D of the shape of a minor diameter cylinder formed so that it might extend in a side besides shaft orientations from female screw section 9C formed in the inner skin of this cylinder part 9B, and the core of said disk section 9A, It is formed and consists of valve element regulation projection 9E which regulates migration of the valve element 12 mentioned later, and heavy-gage part 9F which were formed in the capsule press section 9D periphery of said disk section 9A so that it may extend in a shaft-orientations 1 side from the core of said disk section 9A.

[0032] 10 shows a supply valve and this supply valve 10 consists of the valve element hold section 11 tubed [with a stage] which fixed to disk section 9A of said capsule presser foot 9, and a disc-like valve element 12 held in this valve element hold section 11. Moreover, major-diameter cylinder part 11A of the owner bottom where the end face side fixed said valve element hold section 11 to disk section 9A of said capsule presser foot 9, Minor diameter cylinder part 11B of an owner bottom which fixes at the pars basilaris ossis occipitalis of this major-diameter cylinder part 11A, and holds the disc-like valve element 12 in the interior, Consisting of airstream ON hole 11D formed in pars-basilaris-ossis-occipitalis 11C of this minor diameter cylinder part 11B, the end face section of said minor diameter cylinder part 11B has become annular height 11E projected a little to the capsule presser-foot 9 side rather than the pars basilaris ossis occipitalis of major-diameter cylinder part 11A.

[0033] And if said supply valve 10 presses press section 16C of the pump section 16 and supplies air as shown in drawing 6 , by the airstream which flows in the valve element hold section 11 through airstream ON hole 11D, a valve element 12 will be made into the condition of having opened the supply valve 10 concerned in contact with valve element regulation projection 9E, and will supply the air from the pump section 16 to the capsule presser-foot 9 side. Moreover, valve element regulation projection 9E has regulated that this valve element 12 moves to the major-diameter cylinder part 11A side from minor diameter cylinder part 11B of the valve element hold section 11 by making a valve element 12 contact at the tip.

[0034] By 13, 13, and -- showing the orifice which makes the inflow air-flow-rate regulation means by this example, this each orifice 13 is the direction inside of a path of disk section 9A of the capsule presser foot 9, it is located in a periphery side from capsule press section 9D, for example, four-piece (two pieces are illustrated) drilling is carried out. And this each orifice 13 has regulated the air flow rate supplied to the body 2 side of a medication machine by the bore diameter from the pump section 16.

[0035] Moreover, the annular pump side path where 14 was formed by the capsule presser foot 9 and the valve element hold section 11, and 15 show the body side path formed by the body 2 of a medication machine, and the capsule presser foot 9, respectively, and this pump side path 14 and the body side path 15 are opened for free passage by said each orifice 13.

[0036] 16 shows the pump section formed in the shape of a closed-end cylinder with the rubber ingredient, this pump section 16 consists of press section 16C of the shape of a cylinder formed between heavy-gage opening 16A, pars-basilaris-ossis-occipitalis 16B, and this opening 16A and

pars-basilaris-ossis-occipitalis 16B, and adhesion immobilization of the opening 16A is carried out on the peripheral face of major-diameter cylinder part 11A of the supply valve 10, and the periphery side inferior surface of tongue of disk section 9A.

[0037] 17 shows the suction valve prepared in pars-basilaris-ossis-occipitalis 16B of the pump section 16. This suction valve 17 It is located and formed in a center section and consists of intake path 17A which is open for free passage in the pump section 16, and valve element 17B which are located in the pump section 16, and open and close this intake path 17A. This valve element 17B When pressing press section 16C and supplying air from the pump section 16, the valve is closed, and when press section 16C returns according to elastic force, it opens in order to inhale the open air in the pump section 16.

[0038] Thus, the pump unit 8 by this example is constituted by uniting the pump section 16 with the capsule presser foot 9 equipped with the supply valve 10. And a pump unit 8 forms the medication machine 1 for nasal cavities concerned by inserting capsule press section 9D of the capsule presser foot 9 into the capsule hold hole 3 of the body 2 of a medication machine, and screwing male screw section 2B and female screw section 9C on, after inserting Capsule K in the capsule hold hole 3 of the body 2 of a medication machine, as shown in drawing 4 . In addition, the capsule K in the capsule hold hole 3 is held in the condition of having pressed a little to shaft orientations by capsule press section 9D.

[0039] 18 shows the punching implement for making a hole to the capsule K held in the capsule hold room 3. This punching implement 18 The supporter 19 supported movable in guide cylinder part 2D, and the pins 20 and 20 by which it fixed to this supporter 19, the tip was set to sharp needle point 20A, and the end face side was inserted in each pin insertion holes 6B and 7A, Consisting of return springs 21 prepared between said supporter 19 and the body 2 of a medication machine, this return spring 21 returns a supporter 19 and each pin 20 to the initial valve position which will be in the condition that needle point 20A of each pin 20 advanced into the pin insertion holes 6B and 7A slightly after punching of Capsule K.

[0040] And by resisting a return spring 21, pushing in a supporter 19 in guide cylinder part 2D, and making each pin 20 insert in the pin insertion holes 6B and 7A, the punching implement 18 makes the capsule K in the capsule hold hole 3 penetrate the needle point 20A, and makes four through holes H (refer to drawing 6) penetrated in the direction of a path in the location which the shaft-orientations both-ends side of this capsule K estranged. Moreover, if the thrust of a supporter 19 is removed, a supporter 19 and each pin 20 will retreat to an initial valve position according to the energization force of a return spring 21.

[0041] 22 is the capsule discharge implement formed in the body 2 of a medication machine. Furthermore, this capsule discharge implement 22 Disc-like discharge plate 22A inserted in shaft orientations movable into the capsule hold hole 3, It connects with the lobes [of the pair which projected in the direction of a path from this discharge plate 22A, and was inserted in Slots 2E and 2E]B [22] and 22B, and tip side of this lobe 22B, and consists of control unit 22C located in the both-sides side which makes the longitudinal direction of rectangle section 2C of the body 2 of a medication machine. And as shown in drawing 5 , after ending medication actuation, discharge plate 22A moves the inside of the capsule hold hole 3 to 1 side by removing

the body 2 of a medication machine, and a pump unit 8, and moving control unit 22C of the capsule discharge implement 22 to a shaft-orientations 1 side (the direction of **** a). And Capsule K is eliminated from the capsule hold hole 3 with migration of this discharge plate 22A.

[0042] The medication machine 1 for nasal cavities by this example has a configuration like ****, and explains [next] the use actuation.

[0043] First, Capsule K is held in the medication machine 1 for nasal cavities, and housekeeping operation until it makes four through holes H in this capsule K is explained.

[0044] First, as shown in drawing 4 , after inserting Capsule K from 1 side into the capsule hold hole 3 of the body 2 of a medication machine, capsule press section 9D of the capsule presser foot 9 is inserted from 1 side into the capsule hold hole 3, male screw section 2B and female screw section 9C are screwed on, and a pump unit 8 is connected with the body 2 of a medication machine. Thereby, the capsule K held in the capsule hold hole 3 is held in the condition of having pressed a little to shaft orientations by capsule press section 9D of the capsule presser foot 9.

[0045] And by pushing in the supporter 19 which constitutes the punching implement 18 along with guide cylinder part 2D Each pin 20 which fixed to this supporter 19 is inserted along the pin insertion holes 6B and 7A, and through holes H and H and -- are drilled in the direction of a path of the capsule K held by needle point 20A of each of this pin 20 in the capsule hold hole 3 at four places of the direction both sides of a path estranged to the shaft orientations of this capsule K. Moreover, after drilling each through hole H in Capsule K, a supporter 19 and each pin 20 are returned to an initial valve position according to the energization force of a return spring 21.

[0046] Next, it explains the flow of the air in the medication machine 1 for nasal cavities in case a patient prescribes drug powder for the patient, and that drug powder flows.

[0047] First, a patient presses press section 16C of the pump section 16 in the direction of **** P, as the jet nozzles 4 and 4 of the body 2 of a medication machine are inserted in the nasal cavity of the left and the right, respectively and are shown in drawing 6 . Thereby, the valve element 12 of the supply valve 10 opens, and the air breathed out from the pump section 16 is supplied towards the capsule hold hole 3 through the pump side path 14, an orifice 13, the body side path 15, and each inflow side aeration way.

[0048] After the air from the pump section 16 inserts in the inside of Capsule K at this time, it flows to a patient's nasal cavity through pin insertion hole 7A of each outflow side aeration way 7, outflow path 7B, and the drug powder exhaust nozzle 5. At this time, with the air which flows from the direction side of a path of the capsule hold hole 3, the drug powder in this capsule K is diffused, and this drug powder is conveyed by a patient's nasal cavity with air.

[0049] Here said inflow side aeration ways 6 and 6 and the outflow side aeration ways 7 and 7 In the condition of having estranged in the direction of a path to the capsule hold hole 3, it is formed a pair every so that it may extend in the shaft orientations of the body 2 of a medication machine. Since it is formed in the direction of a path so that pin insertion hole 6B of each inflow side aeration way 6 may counter mutually, the inflow air which flows in Capsule K from pin insertion hole 6B of each inflow side aeration way 6 It can collide within Capsule K, respectively,

a turbulent flow can be generated, and the drug powder in this capsule K can be efficiently diffused in air.

[0050] Moreover, since pin insertion hole 7A of each outflow side aeration way 7 is also formed in the direction of a path so that it may counter mutually to the capsule hold hole 3, it can prevent that the air which flows out of the inside of Capsule K flows straight towards the drug powder exhaust nozzles 5 and 5 to shaft orientations, and it can raise the diffusibility of the drug powder in Capsule K also near the through hole H by the side of an outflow.

[0051] That is, in this example, since it is formed so that pin insertion hole 6B of each inflow side aeration way 6 may counter the direction side of a path to the capsule hold hole 3, the air which flows through a through hole H in Capsule K collides within Capsule K, and generates a turbulent flow. For this reason, even when the super-atomized drug powder is used, the drug powder in Capsule K can be efficiently diffused in inflow air, and a patient's nasal cavity can be certainly medicated with the drug powder in Capsule K through each outflow side aeration way 7 and the drug powder exhaust nozzle 5.

[0052] Consequently, after generating the turbulent flow in this capsule K with the air which flows in Capsule K and diffusing the drug powder in Capsule K in air by this turbulent flow, the medication machine 1 for nasal cavities of this example can convey the air containing drug powder to a patient's nasal cavity, can lessen extremely the amount of the drug powder which remains in Capsule K, and can abolish the variation in a dose.

[0053] Furthermore, since the air which flows into Capsule K flows through each orifice 13 located between the inflow side aeration ways 6 from the pump section 16, it can regulate the air flow rate which flows in Capsule K with the bore diameter of each of this orifice 13. Consequently, specific gravity is light, and the drug powder with which it filled up in Capsule K can raise the diffusibility in this capsule K more by making the bore diameter of this orifice 13 small, and lessening an inflow air flow rate, when [when particle size is also small] super-atomizing.

[0054] Here, when the flow of air is extracted by the orifice 13 based on drawing 7 and drawing 8 , it explains that the drug powder and air with which it filled up in Capsule K flow.

[0055] First, when the capsule K by which it filled up with the super-atomized drug powder is used, the rate of flow of the flowing air can be slowed down with this drug powder, can lose the stagnation section of the air in a capsule, and can convey the drug powder in Capsule K certainly.

[0056] On the other hand, as shown in drawing 8 , the air which flows in Capsule K from each through hole H by the side of an inflow collides mutually, generates a turbulent flow, and flows towards the through hole H by the side of an outflow from the through hole H by the side of an inflow. Since the rate of flow of a rat tail and air becomes [the flow of air] slow by the orifice 13 at this time, airstream is slushed to the edge of Capsule K and the stagnation section of air is not formed.

[0057] For this reason, when the capsule K which filled up the medication machine 1 for nasal cavities which attached the capsule presser foot 9 which has the minor diameter orifice 13 with the super-atomized drug powder is used, this atomized drug powder can be efficiently diffused

in air by the turbulent flow formed in Capsule K, without slowing down the rate of flow of air. And the drug powder in Capsule K can be certainly conveyed by this airstream.

[0058] thus, with the medication vessel 1 for nasal cavities by this example Since the inflow side aeration ways 6 and 6 which extend in the shaft orientations of the body 2 of a medication machine, and the outflow side aeration ways 7 and 7 were formed, respectively in the condition of having estranged in the direction of a path to the capsule hold hole 3 The air which the flow of the air which flows into Capsule K through each inflow side aeration way 6 is made to flow from the direction side of a path, and flows within this capsule K can collide, and can generate a turbulent flow.

[0059] And since this inflow air flow rate is regulated by the bore diameter of the orifice 13 formed in the capsule presser foot 9 located in the upstream of the body 2 of a medication machine, in the case of the super-atomized drug powder, by making the bore diameter of the orifice 13 concerned small, it can extract an inflow air flow rate, can make a turbulent flow prudent in Capsule K to all the corners, and can convey the drug powder in Capsule K certainly by this turbulent flow. And the drug powder which remains in Capsule K can be lost, and medication effectiveness can be raised.

[0060] In addition, specific gravity of drug powder is heavy, and in being drug powder with a large particle size, the inflow air which flows in a capsule flows with sufficient vigor from a through hole by enlarging a bore diameter like orifice 13', as shown in drawing 9 . At this time, the drug powder with a big particle size can slow down the rate of the flowing air, can lose the stagnation section generated in a capsule, and can convey the drug powder in Capsule K certainly.

[0061] In this way, in this example, since the inflow side aeration ways 6 and 6 of a pair and the outflow side aeration way aeration ways 7 and 7 were formed in the direction of a path of a capsule hold hole, the airstream which flows from [of Capsule K] a path makes a turbulent flow generate in Capsule K, diffuses drug powder efficiently in air in this turbulent flow, and can convey the drug powder in Capsule K towards a patient's nasal cavity.

[0062] And the air flow rate which flows in Capsule K can be regulated with the bore diameter of the orifice 13 formed in the upstream of the body 2 of a medication machine by being located, and can lose the stagnation section of the air generated in Capsule K by choosing the capsule presser foot 9 or 9' alternatively by the physical properties of the drug powder with which it filled up in Capsule K. Consequently, the amount of the drug powder which remains in Capsule K after medication actuation termination can be reduced sharply, and can abolish the variation in the dose of the drug powder to a patient.

[0063] Next, the description of this example changes the configuration of a capsule presser foot into the 2nd example by this invention being shown in drawing 10 , and is to have constituted an air-flow-rate regulation means to regulate the air flow rate supplied to the capsule hold hole 3 from an orifice formed in the direction of a path. In addition, in this example, the same sign shall be given to the same component as the 1st example mentioned above, and the explanation shall be omitted.

[0064] 31 show the capsule presser foot by this example among drawing, and this capsule

presser foot 31 is used instead of the capsule presser foot 9 stated in the 1st example. This capsule presser foot 31 It is the opening hole 31A1 to a center section. Short length cylinder part 31B formed so that it might be located in the periphery side of disk section 31A which it has, and this disk section 31A and might extend in the side else, Valve element regulation projection 31D which is formed so that it may extend in a side besides shaft orientations from female screw section 31C formed in the inner skin of this cylinder part 31B, and the core of said disk section 31A, and regulates migration of the valve element 12 of the supply valve 10, While consisting of heights 31E projected from the core of said disk section 31A to disc-like towards the side besides shaft orientations and forming in the center section of said disk section 31A maintenance hole 31F holding the below-mentioned capsule press rod 32 which carries out opening to 1 side opening hole 31A1 of said disk section 31A **** -- taper surface part 31G are formed.

[0065] 32 shows a capsule press rod and attaching part 32C by which this capsule press rod 32 is fitted in at the tip of said narrow diameter portion 32A maintenance hole 31F by setting 1 side to narrow diameter portion 32A, and setting the side else to major diameter 32B is formed.

[0066] 33 and 33 show the orifice which makes the inflow air content regulation means by this example, this each orifice 33 is drilled in the direction of a path of said heights 31E, and it is the opening hole 31A1. The supply valve 10 side is made to open for free passage.

[0067] In addition, the supply valve 10 which becomes a side besides said disk section 31A from the valve element hold section 11 mentioned above and a valve element 12 has fixed.

[0068] Thus, also in the capsule presser foot 31 by this example constituted, like the 1st example mentioned above, the pump section 16 is fixed to the capsule presser foot 31, a pump unit 8 is formed, and the medication machine for nasal cavities by the 1st example consists of this pump unit 8 and a body 2 of a medication machine.

[0069] This medication machine for nasal cavities can acquire the same operation effectiveness as the 1st example mentioned above, can make air able to flow from a path to Capsule K, and can diffuse the drug powder in Capsule K efficiently. Furthermore, by making it correspond to the physical properties of the drug powder in a capsule, and setting up the bore diameter of an orifice 33, the drug powder in a capsule can be certainly conveyed to a patient's nasal cavity, and medication effectiveness can be raised.

[0070] Furthermore, the description of this example is that the 3rd example is shown in drawing 11 to have arranged in the both sides of a capsule the punching implement formed in the body of a medication machine, respectively. In addition, in this example, the same sign shall be given to the same component as the 1st example mentioned above, and the explanation shall be omitted.

[0071] Major diameter 41A which 41 showed the body of a medication machine by this example among drawing, and the appearance of this body 41 of a medication machine was constituted like the body 2 of a medication machine mentioned above, and was formed in the shape of [short length] a cylinder by the shaft-orientations 1 side, Male screw section 41B formed in the peripheral face of this major diameter 41A, and rectangle section 41C formed from the double width section and the narrow-width section so that a cross section might make the shape of a

rectangle towards the side else from said major diameter 41A, The guide cylinder parts 41D and 41D which support the supporter 48 of each punching implement 47 which prolongs and protrudes on the narrow-width section of this rectangle section 41C, and is mentioned later movable, and in order to make said rectangle section 41C move the capsule discharge implement 51 to shaft orientations It consists of slot 41E (only one side is illustrated) formed in the capsule hold hole 42 by penetrating.

[0072] 42 shows a capsule hold hole, and this capsule hold hole 42 is formed as a closed-end hole so that opening may be carried out to the pump-unit 8 side located in the 1 side from the center section of said body 41 of a medication machine. Moreover, the capsule hold room is constituted by inserting capsule press section 9D of a pump unit 8 from 1 side into this capsule insertion hole 42.

[0073] 43 and 43 are jet nozzles, this each jet nozzle 43 protrudes in the condition of it having been located in the other end side of rectangle section 41C of said body 41 of a medication machine, and having estranged, and the drug powder exhaust nozzles 44 and 44 used as opening of the below-mentioned outflow paths 46B and 46B are formed in the shaft orientations in this each jet nozzle 43.

[0074] 45 and 45 show the inflow side [2] aeration way established in the 1 side of the body 2 of a medication machine. This each close side aeration way 45 The inflow paths 45A and 45A formed in the shaft-orientations side of the body 41 of a medication machine so that it might be located in the periphery side of the direction of a path of the capsule hold hole 42 and opening might be carried out to a pump-unit 8 side, It consists of pin insertion holes 45B and 45B formed in the direction of a path so that it might be open for free passage with this each inflow path 45A and opening might be carried out to the capsule hold hole 42. And each inflow side aeration way 45 supplies the air supplied from the pump section 16 from the direction side of a path of the capsule hold hole 42.

[0075] 46 and 46 show the outflow side [2] aeration way established in the side besides the body 41 of a medication machine. This each outflow side aeration way 46 The pin insertion holes 46A and 46A formed in the direction side of a path so that opening might be carried out to the capsule hold hole 42, It is open for free passage with this each pin insertion hole 46A, and consists of outflow paths 46B and 46B as a shaft-orientations path formed where it was located in the periphery side of the direction of a path of said capsule hold hole 42 and the diameter is expanded towards said drug powder exhaust nozzle 44. And each outflow side aeration way 46 is opening the direction side of a path and each drug powder exhaust nozzle 44 of the capsule hold room 42 for free passage, respectively.

[0076] 47 and 47 show the punching implement for making a hole to the capsule (not shown) held in the capsule hold room 42 from the left and the right. This each punching implement 47 The supporter 48 supported movable in each guide cylinder part 41D, and the pins 49 and 49 by which it fixed to this supporter 48, the tip was set to sharp needle point 49A, and the end face side was inserted in each pin insertion holes 45B and 46A, It consists of return springs 50 prepared between said supporter 48 and the body 41 of a medication machine. This each return spring 50 Needle point 49A of each pin 49 returns a supporter 48 and each pin 49 after

punching of a capsule to the initial valve position which will be in the condition of having advanced into the pin insertion holes 45B and 46A slightly.

[0077] And by resisting a return spring 50, pushing in a supporter 48 in guide cylinder part 41D, and making each pin 49 insert in the pin insertion holes 45B and 46A, each punching implement 47 makes the capsule in the capsule hold hole 42 penetrate the needle point 49A, and makes four through holes (not shown). Moreover, if the thrust of a supporter 48 is removed, a supporter 48 and each pin 49 will retreat to an initial valve position according to the energization force of a return spring 50.

[0078] Furthermore, 51 is the capsule discharge implement formed in the body 41 of a medication machine.

[0079] Thus, also in the medication machine for nasal cavities constituted, the same operation effectiveness as the 1st example mentioned above can be acquired, air can be made to be able to flow from a path to a capsule, and the drug powder in a capsule can be diffused efficiently. Furthermore, by making it correspond to the physical properties of the drug powder in a capsule, setting up the bore diameter of an orifice 13, and regulating the object for inflow airstreams, the drug powder in a capsule can be certainly conveyed to a patient's nasal cavity, and medication effectiveness can be raised.

[0080] In addition, although considered as the configuration which holds the capsule K by which it filled up with drug powder in the capsule hold hole 3 (42) in said each example, it is good also as a configuration which changes to this, for example, establishes a drug powder hold room in the body of a medication machine, fills up this drug powder hold room with drug powder directly, and spouts this drug powder.

[0081]

[Effect of the Invention] As explained in full detail above, according to this invention of claim 1, the air supplied from the pump section flows from the direction side of a path of a drug powder hold room by each inflow side aeration way, collides in this drug powder hold interior of a room, and generates a turbulent flow. And it can spout towards a patient's nasal cavity through each outflow side aeration way from a drug powder exhaust nozzle, and the air which the drug powder of the drug powder hold interior of a room was diffused and mixed by this airstream in air, and contained this drug powder can abolish the variation in a dose.

[0082] According to invention of claim 2, the air supplied from the pump section flows from the direction side of a path of a capsule hold room by each inflow side aeration way, collides in this capsule hold interior of a room, and generates a turbulent flow. And the air which the drug powder in the capsule held in the capsule hold room was diffused and mixed by this airstream in air, and contained this drug powder can be spouted towards a patient's nasal cavity through an outflow side aeration way from a drug powder exhaust nozzle.

[0083] According to invention of claim 3, the air supplied from the pump section flows from the direction side of a path of a drug powder hold room by each inflow side aeration way, collides in this drug powder hold interior of a room, and generates a turbulent flow. And the air which the drug powder of the drug powder hold interior of a room was diffused and mixed by this airstream in air, and contained this drug powder can be spouted towards a patient's nasal

cavity through an outflow side aeration way from a drug powder exhaust nozzle. Moreover, since the air flow rate supplied to the drug powder hold interior of a room through each inflow side aeration way from the pump section is regulated by the orifice, by changing the diameter of an orifice and adjusting an inflow air flow rate according to physical properties, such as particle size of drug powder, specific gravity, and a fluidity, it can diffuse efficiently the drug powder of the drug powder hold interior of a room to inflow air, can lessen extremely the amount of the drug powder which remains in the drug powder hold interior of a room, and can abolish the variation in a dose.

[0084] According to invention of claim 4, the air supplied from the pump section flows from the direction side of a path of a capsule hold room by each inflow side aeration way, collides in this capsule hold interior of a room, and generates a turbulent flow. And the air which the drug powder in the capsule held in the capsule hold room was diffused and mixed by this airstream in air, and contained this drug powder can be spouted towards a patient's nasal cavity through an outflow side aeration way from a drug powder exhaust nozzle. Moreover, since the air flow rate supplied to the drug powder hold interior of a room through each inflow side aeration way from the pump section is regulated by the orifice, it can diffuse efficiently the drug powder of the drug powder hold interior of a room to inflow air by changing the diameter of an orifice and adjusting an inflow air flow rate according to physical properties, such as particle size of drug powder, specific gravity, and a fluidity.

[0085] In invention of claim 5, the pin insertion hole used at the time of punching of a capsule is made into a part of inflow side aeration way and outflow side aeration way, and since this each pin insertion hole is located in the direction side of a path to a capsule hold room and is formed, the through hole drilled by the capsule can be made to be able to counter in the direction of a path, and can be formed. Moreover, the air which flows in a capsule through each inflow side aeration way can collide within a capsule, can generate a turbulent flow in this capsule, and can diffuse drug powder in air efficiently. And since the air in a capsule flows to a nasal cavity through the pin insertion hole of each outflow side aeration way, a shaft-orientations path, and a drug powder exhaust nozzle, it can convey drug powder by this airstream.

[0086] In invention of claim 6, the air supplied from the pump section can flow to a nasal cavity through each inflow side aeration way, a drug powder hold room or a capsule hold room, each outflow side aeration way, and a drug powder exhaust nozzle, and can convey a drug powder hold room or the drug powder of the capsule hold interior of a room to a nasal cavity by this airstream.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the medication machine for nasal cavities by the 1st example.

[Drawing 2] It is drawing of longitudinal section of the medication machine for nasal cavities by the 1st example.

[Drawing 3] It is drawing of longitudinal section showing only the pump unit of the medication machine for nasal cavities in drawing 2 .

[Drawing 4] It is the decomposition sectional view showing the condition before inserting a capsule in the medication machine for nasal cavities.

[Drawing 5] It is drawing of longitudinal section showing the condition of removing a capsule from the body of a medication machine.

[Drawing 6] It is drawing of longitudinal section showing medication actuation of the medication machine for nasal cavities by the 1st example.

[Drawing 7] It is drawing of longitudinal section of the capsule presser foot which has an orifice.

[Drawing 8] It is the explanatory view showing the flow of the air in a capsule when using the capsule presser foot of drawing 7 .

[Drawing 9] It is drawing of longitudinal section of the capsule presser foot at the time of enlarging the bore diameter of an orifice.

[Drawing 10] It is drawing of longitudinal section showing the capsule presser foot by the 2nd example.

[Drawing 11] It is drawing of longitudinal section of the medication machine for nasal cavities by the 3rd example.

[Description of Notations]

1 Medication Machine for Nasal Cavities

2 41 Body of a medication machine

3 42 Capsule hold hole (drug powder hold room)

4 43 Jet nozzle

5 44 Drug powder exhaust nozzle

6 45 Inflow side aeration way

6A, 45A Inflow path

6B, 7B, 45B, 46A Pin insertion hole

7 46 Outflow side aeration way

7A, 46B Outflow path (shaft-orientations path)

8 Pump Unit

13 33 Orifice

16 Pump Section

18 47 Punching implement

20 49 Pin

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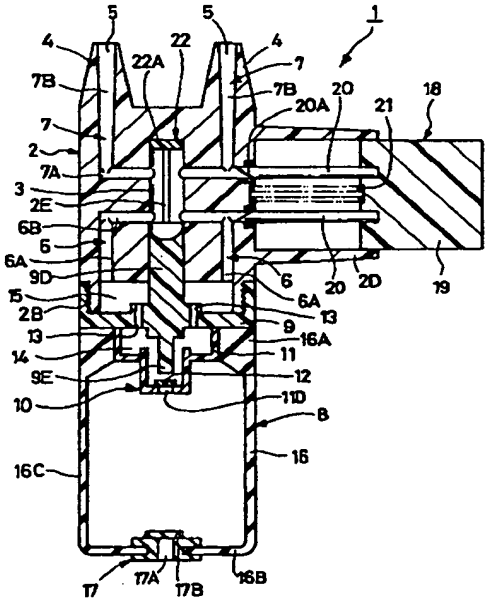
(54)【発明の名称】　鼻腔用投薬器

(57)【要約】

【課題】　カプセル内の薬粉を投与する投薬器において、ポンプ部から供給された空気によりカプセル内に乱流を発生させると共に、流入空気流量を規制することにより、薬粉の物性に対応させて、薬粉を確実に患者に投与する。

【解決手段】　投薬器本体２のカプセル収容穴３には径方向からカプセル内に空気が流入するように、各流入側通気路６と各流出側通気路７とが、カプセル収容穴３に対して径方向に位置して形成されている。ポンプ部１６と投薬器本体２との間にはオリフィス１３を有するカプセル押え９が設けられ、オリフィス１３により流入空気量を規制して、カプセル内の隅々まで乱流を発生させ、この乱流で薬粉を確実に拡散させ、薬粉を患者の鼻腔に搬送することができる。



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【特許請求の範囲】

【請求項１】　軸方向の途中に薬粉を収容する薬粉収容室が設けられた投薬器本体と、該投薬器本体の薬粉収容室に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該ポンプ部から供給される空気を薬粉収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該薬粉収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路とから構成してなる鼻腔用投薬器。

【請求項２】　軸方向の途中に薬粉を収容する薬粉収容室が設けられた投薬器本体と、該投薬器本体の薬粉収容室に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該ポンプ部から供給される空気を薬粉収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該薬粉収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路と、前記各流入側通気路とポンプ部との間に設けられ、該ポンプ部から流入側通気路を介して薬粉収容室内に供給する空気流量を規制するオリフィスとから構成してなる鼻腔用投薬器。

【請求項３】　軸方向の途中に薬粉が充填されたカプセルを収容するカプセル収容室が設けられた投薬器本体と、該投薬器本体のカプセル収容室に収容されたカプセル内に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該ポンプ部から供給される空気をカプセル収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該カプセル収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路とから構成してなる鼻腔用投薬器。

【請求項４】　軸方向の途中に薬粉が充填されたカプセルを収容するカプセル収容室が設けられた投薬器本体と、該投薬器本体のカプセル収容室に収容されたカプセル内に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該ポンプ部から供給される空気をカプセル収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該カプセル収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路と、前記各流入側通気路とポンプ部との間に設けられ、該ポンプ部から流入側通気路を介してカプセル収容室内に供給する空気流量を規制するオリフィスとから構成してなる鼻腔用投薬器。

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【請求項５】　前記流入側通気路は、ポンプ部に開口するように投薬器本体の軸方向に形成された流入通路と、該流入通路と連通しカプセル収容室の側方に開口するように径方向に形成されたピン挿通穴とから構成し、前記流出側通気路は、カプセル収容室の側方に開口するように径方向に形成されたピン挿通穴と、該ピン挿通穴と連通し薬粉噴出口に開口するように投薬器本体の軸方向に形成された軸方向通路とから構成し、前記穴あけ具は投薬器本体の側方に位置し前記各ピン挿通穴に挿通されて径方向に可動な一対のピンから構成してなる請求項３または４記載の鼻腔用投薬器。

【請求項６】　前記投薬器本体の軸方向他側には前記流出側通気路が形成されると共に鼻腔に挿入される一対の噴出ノズルが突設され、該各噴出ノズルの先端を前記各薬粉噴出口としてそれぞれ開口してなる請求項１，２，３，４または５記載の鼻腔用投薬器。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、薬粉収容室内に収容した薬粉を患者に投与するのに用いて好適な鼻腔用投薬器に関する。

【０００２】

【従来の技術】一般に、鼻アレルギー等の患者には粉体状の薬品を鼻腔内に噴出する治療法が採用されている。また、この治療法では、専用の噴出器を用いて、例えば粉体状の薬品が充填されたカプセル等をカプセル収容室内に収容し、該カプセル内の薬粉を鼻腔内に投与するようになっている。

【０００３】さらに、この治療法に用いられる噴出器としては、特開昭５９－３４２６７号公報（以下、従来技術という）に示すものが知られている。

【０００４】この従来技術における噴出器では、円筒部材の空気流入側にポンプ部を設け、該円筒部材の空気流出側にはカプセルが挿入される凹形状部を形成すると共に、該円筒部材の先端側には薬粉噴出口となる開口部を形成した先端部を着脱可能に設け、該円筒部材に先端部を嵌合することによって内部にカプセル収容部を形成している。さらに、前記円筒部材と先端部にかけて着脱可能に嵌合するキャップを有し、該キャップ内には軸方向に延びる針を設け、前記円筒部材に先端部を嵌合させた状態でキャップを装着することにより、該キャップ内の針でカプセル収容部内に収容されたカプセルの穴あけを行う構成となっている。

【０００５】このように構成される従来技術では、粉体状の薬粉が充填されたカプセルを円筒部材の凹形状部に挿入し、キャップ内に設けた針によって該カプセルの軸方向両側に穴をあけた後、先端部を患者の左，右の鼻腔のうち、いずれか一方の鼻腔に挿入し、この状態でポンプ部を押圧することにより、ポンプ部からの空気によってカプセル内の薬粉を開口部から患者の鼻腔内に噴出する。そして、従来技術による噴出器は、患者の左，右の鼻腔に先端部を交互に挿入し、その都度ポンプ部の押圧動作を繰返すことにより、薬粉の投与を行うようになっている。

【０００６】

【発明が解決しようとする課題】ところで、従来技術による噴出器は、カプセルの軸方向両側に穴を２箇所あけ、この穴を介してカプセル内の軸方向に空気流を発生させ、この空気流により該カプセル内の薬粉を薬粉噴出口から噴出するものである。

【０００７】このため、カプセル内の薬粉の物性（粒径、比重、流動性等）、特に超微粒化した薬粉を用いた場合には、この薬粉はポンプ部から供給される空気に効率よく拡散することができず、投薬終了後でもカプセル内に薬粉が残存し、薬粉を十分患者の鼻腔に向けて噴出することができないことがある。このような場合には、患者に投与される薬粉量（以下、投与量という）にバラツキが生じてしまうという問題がある。

【０００８】本発明は上述した従来技術の問題に鑑みなされたもので、本発明は薬粉収容室内に充填された薬粉を供給される空気に効率よく拡散し、規定量の薬粉を患者に投与できるようにした鼻腔用投薬器を提供することを目的としている。

【０００９】

【課題を解決するための手段】上述した課題を解決するために、請求項１の発明が採用する鼻腔用投薬器は、軸方向の途中に薬粉を収容する薬粉収容室が設けられた投薬器本体と、該投薬器本体の薬粉収容室に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該ポンプ部から供給される空気を薬粉収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該薬粉収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路とから構成したことにある。

【００１０】上記構成により、ポンプ部を押圧して該ポンプ部から空気を供給すると、この空気は、各流入側通気路、薬粉収容室、各流出側通気路を介して薬粉噴出口に流れる。このとき、ポンプ部から供給される空気は、薬粉収容室の径方向側方から流入し、該薬粉収容室内で衝突する。そして、薬粉収容室内の薬粉は、この空気流によって空気中に拡散して混合され、この薬粉を含んだ空気は、各流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出できる。

【００１１】請求項２の発明が採用する鼻腔用投薬器は、軸方向の途中に薬粉を収容する薬粉収容室が設けられた投薬器本体と、該投薬器本体の薬粉収容室に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該ポンプ部から供給される空気を薬粉収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体に薬粉収容室を挟んで対向するように形成され、該薬粉収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路と、前記各流入側通気路とポンプ部との間に設けられ、該ポンプ部から流入側通気路を介して薬粉収容室内に供給する空気流量を規制するオリフィスとから構成したことにある。

【００１２】上記構成により、薬粉収容室内の薬粉は、ポンプ部から各流入側通気路、薬粉収容室、各流出側通気路を介して薬粉噴出口に流れる空気流によって、薬粉収容室内で空気中に拡散し、この薬粉を含んだ空気は、流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出できる。また、ポンプ部から各流入側通気路を介して薬粉収容室内に供給される空気流量は、オリフィスによって規制されているから、薬粉の物性（粒径、比重、流動性等）、例えば薬粉の比重が軽く、粒径が小さいときには、オリフィスによって流入空気流量を少なくすることにより、薬粉収容室内の薬粉を流入空気に効率よく拡散できる。

【００１３】請求項３の発明が採用する鼻腔用投薬器は、軸方向の途中に薬粉が充填されたカプセルを収容するカプセル収容室が設けられた投薬器本体と、該投薬器本体のカプセル収容室に収容されたカプセル内に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該ポンプ部から供給される空気をカプセル収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該カプセル収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路とから構成したことにある。

【００１４】上記構成により、ポンプ部を押圧して該ポンプ部から空気を供給すると、この空気は、各流入側通気路、カプセル収容室、各流出側通気路を介して薬粉噴出口に流れる。このとき、ポンプ部から供給される空気は、カプセル収容室内のカプセルの径方向側方から流入し、該カプセル内で衝突する。そして、カプセル内の薬

粉は、この空気流によって空気中に拡散して混合され、この薬粉を含んだ空気は、流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出できる。

【００１５】請求項４の発明が採用する鼻腔用投薬器は、軸方向の途中に薬粉が充填されたカプセルを収容するカプセル収容室が設けられた投薬器本体と、該投薬器本体のカプセル収容室に収容されたカプセル内に空気を供給するために該投薬器本体の軸方向一側に設けられたポンプ部と、鼻腔に薬粉を噴出すべく前記投薬器本体の軸方向他側に設けられた一対の薬粉噴出口と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該ポンプ部から供給される空気をカプセル収容室内に径方向側方から供給する一対の流入側通気路と、前記投薬器本体にカプセル収容室を挟んで対向するように形成され、該カプセル収容室の径方向側方と前記各薬粉噴出口とをそれぞれ連通する一対の流出側通気路と、前記各流入側通気路とポンプ部との間に設けられ、該ポンプ部から流入側通気路を介してカプセル収容室内に供給する空気流量を規制するオリフィスとから構成したことにある。

【００１６】上記構成により、薬粉収容室内の薬粉は、ポンプ部から各流入側通気路、カプセル収容室、各流出側通気路を介して薬粉噴出口に流れる空気流によって、カプセル収容室に収容された薬粉が充填ざれたカプセル内で空気中に拡散し、この薬粉を含んだ空気は、各流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出することができる。また、ポンプ部から各流入側通気路を介して薬粉収容室内に供給される空気流量は、オリフィスによって規制されているから、薬粉の物性（粒径、比重、流動性等）、例えば薬粉の比重が軽く、粒径が小さいときには、オリフィスによって流入空気流量を少なくすることにより、薬粉収容室内の薬粉を流入空気に効率よく拡散できる。

【００１７】請求項５の発明は、前記流入側通気路は、ポンプ部に開口するように投薬器本体の軸方向に形成された流入通路と、該流入通路と連通しカプセル収容室の側方に開口するように径方向に形成されたピン挿通穴とから構成し、前記流出側通気路は、カプセル収容室の側方に開口するように径方向に形成されたピン挿通穴と、該ピン挿通穴と連通し薬粉噴出口に開口するように投薬器本体の軸方向に形成された軸方向通路とから構成し、前記穴あけ具は投薬器本体の側方に位置し前記各ピン挿通穴に挿通されて径方向に可動な一対のピンから構成したことにある。

【００１８】上記構成により、カプセルの穴あけ時に用いるピン挿通穴を、流入側通気路と流出側通気路の一部とし、該各ピン挿通穴をカプセル収容室に対して径方向に位置させて形成するから、カプセルに穿設される貫通穴を径方向に対向させて形成することができる。そして、各流入側通気路を介してカプセル内に流入する空気

はカプセル内で衝突し、該カプセル内に乱流を発生させ、薬粉を効率よく空気中に拡散させることができ、この薬粉が拡散された空気を、各流出側通気路のピン挿通穴、軸方向通路、さらに薬粉噴出口を介して鼻腔に搬送できる。

【００１９】請求項６の発明は、前記投薬器本体の軸方向他側には前記流出側通気路が形成されると共に鼻腔に挿入される一対の噴出ノズルが突設され、該各噴出ノズルの先端を前記各薬粉噴出口としてそれぞれ開口したことにある。

【００２０】上記構成により、ポンプ部から供給される空気は、各流入側通気路、薬粉収容室またはカプセル収容室、各流出側通気路、各薬粉噴出口を介して鼻腔に流れ、この空気流によって、薬粉収容室またはカプセル収容室内の薬粉を鼻腔に搬送することができる。

【００２１】

【発明の実施の形態】以下、本発明による実施の形態を添付図面に従って詳細に説明する。

【００２２】まず、図１ないし図９に本発明による第１の実施例を示す。

【００２３】図中、１は本実施例による鼻腔用投薬器を示し、該鼻腔用投薬器１は、後述するカプセル収容穴３、薬粉を噴出する噴出ノズル４、穴あけ具１８等を有する投薬器本体２と、該投薬器本体２の一側に螺着され、カプセル押え９、供給弁１０、ポンプ部１６等を備えたポンプユニット８とから大略構成されている。

【００２４】２は投薬器本体を示し、該投薬器本体２の外形は、軸方向一側で短尺な円筒状に形成された大径部２Ａと、該大径部２Ａの外周面に形成されたおねじ部２Ｂと、前記大径部２Ａから他側に向けて断面が長方形状をなし、広幅部と狭幅部とから形成された矩形部２Ｃと、該矩形部２Ｃの狭幅部と平行に延びて突設され、後述する穴あけ具１８の支持部１９を可動に支持するガイド筒部２Ｄと、前記矩形部２Ｃの広幅部方向の両側面に位置して、カプセル排出具２２を軸方向に移動させるために、前記カプセル収容穴３に貫通して形成された長穴２Ｅ，２Ｅとから構成されている。

【００２５】３はカプセル収容穴を示し、該カプセル収容穴３は前記投薬器本体２の中央部から一側に位置したポンプユニット８側に開口するように有底穴として形成されている。そして、該カプセル収容穴３は、前記ポンプユニット８のカプセル押圧部９Ｄを一側から挿入することにより、カプセル収容室を構成している。

【００２６】４，４は噴出ノズルで、該各噴出ノズル４は前記投薬器本体２の矩形部２Ｃの他端面に位置して左，右に離間した状態で突設され、該各噴出ノズル４の開口部が薬粉噴出口５となっている。

【００２７】ここで、前記各薬粉噴出口５は、流出側通気路７を介して空気と共に流れる薬粉を、鼻腔に向けて噴出するものである。

【００２８】６，６は投薬器本体２の一側に設けられた２本の流入側通気路を示し、該各入側通気路６は、カプセル収容穴３の径方向外周側に位置してポンプユニット８側に開口するように投薬器本体２の軸方向に形成された流入通路６Ａ，６Ａと、該各流入通路６Ａと連通しカプセル収容穴３に開口するように径方向側方に形成されたピン挿通穴６Ｂ，６Ｂとから構成されている。そして、各流入側通気路６はポンプ部１６から供給される空気をカプセル収容穴３の径方向側方から供給するようになっている。

【００２９】７，７は投薬器本体２の他側に設けられた２本の流出側通気路を示し、該各流出側通気路７は、カプセル収容穴３に開口するように径方向側方に形成されたピン挿通穴７Ａ，７Ａと、該ピン挿通穴７Ａと連通し、カプセル収容穴３の径方向の外周側に位置して前記薬粉噴出口５に向けて拡径した状態で形成された軸方向通路となる流出通路７Ｂ，７Ｂとから構成されている。そして、各流出側通気路７はカプセル収容穴３の径方向側方と各薬粉噴出口５とをそれぞれ連通している。

【００３０】８は投薬器本体２の一側に設けられたポンプユニットを示し、該ポンプユニット８は、図３に示す如く、投薬器本体２のおねじ部２Ｂに螺着される後述のカプセル押え９と、該カプセル押え９に固着された供給弁１０と、前記カプセル押え９の弁体収容部１１外周に固着されたポンプ部１６とから構成されている。

【００３１】９はカプセル押えで、該カプセル押え９は、一側に位置した大径な円板部９Ａと、該円板部９Ａの外周側に位置して他側に延びるように形成された短尺な筒部９Ｂと、該筒部９Ｂの内周面に形成されためねじ部９Ｃと、前記円板部９Ａの中心部から軸方向他側に延びるように形成された小径円柱状のカプセル押圧部９Ｄと、前記円板部９Ａの中心部から軸方向一側に延びるように形成され、後述する弁体１２の移動を規制する弁体規制突起９Ｅと、前記円板部９Ａのカプセル押圧部９Ｄ外周に形成された厚肉部９Ｆとから構成されている。

【００３２】１０は供給弁を示し、該供給弁１０は、前記カプセル押え９の円板部９Ａに固着された段付筒状の弁体収容部１１と、該弁体収容部１１内に収容された円板状の弁体１２とからなっている。また、前記弁体収容部１１は、基端側が前記カプセル押え９の円板部９Ａに固着された有底の大径筒部１１Ａと、該大径筒部１１Ａの底部に固着され、内部に円板状の弁体１２を収容する有底の小径筒部１１Ｂと、該小径筒部１１Ｂの底部１１Ｃに形成された空気流入穴１１Ｄとからなり、前記小径筒部１１Ｂの基端部は、大径筒部１１Ａの底部よりもカプセル押え９側に若干突出した環状突起部１１Ｅとなっている。

【００３３】そして、前記供給弁１０は、図６に示すように、ポンプ部１６の押圧部１６Ｃを押圧して空気を供給すると、弁体１２は、空気流入穴１１Ｄを介して弁体収容部１１内に流入される空気流により、弁体規制突起９Ｅに当接して当該供給弁１０を開弁した状態とし、ポンプ部１６からの空気をカプセル押え９側に供給する。また、弁体規制突起９Ｅは、その先端に弁体１２を当接させることにより、該弁体１２が弁体収容部１１の小径筒部１１Ｂから大径筒部１１Ａ側に移動するのを規制している。

【００３４】１３，１３，…は本実施例による流入空気流量規制手段をなすオリフィスを示し、該各オリフィス１３は、カプセル押え９の円板部９Ａの径方向内側で、かつカプセル押圧部９Ｄより外周側に位置し、例えば４個（２個のみ図示）穿設されている。そして、該各オリフィス１３は、その穴径によりポンプ部１６から投薬器本体２側に供給される空気流量を規制している。

【００３５】また、１４はカプセル押え９と弁体収容部１１とにより画成された環状のポンプ側通路、１５は投薬器本体２とカプセル押え９とにより画成された本体側通路をそれぞれ示し、該ポンプ側通路１４と本体側通路１５とは前記各オリフィス１３によって連通されている。

【００３６】１６はゴム材料により有底円筒状に形成されたポンプ部を示し、該ポンプ部１６は、厚肉な開口部１６Ａと、底部１６Ｂと、該開口部１６Ａと底部１６Ｂとの間に形成された円筒状の押圧部１６Ｃとからなり、開口部１６Ａは供給弁１０の大径筒部１１Ａの外周面と円板部９Ａの外周側下面に接着固定されている。

【００３７】１７はポンプ部１６の底部１６Ｂに設けられた吸込弁を示し、該吸込弁１７は、中央部に位置して形成され、ポンプ部１６内と連通する吸込通路１７Ａと、ポンプ部１６内に位置して該吸込通路１７Ａを開閉する弁体１７Ｂとからなり、該弁体１７Ｂは、押圧部１６Ｃを押圧してポンプ部１６から空気を供給するときに閉弁し、押圧部１６Ｃが弾性力によって復帰するときに、ポンプ部１６内に外気を吸込むべく開弁する。

【００３８】このように、本実施例によるポンプユニット８は、供給弁１０を備えたカプセル押え９にポンプ部１６を一体化することにより構成されている。そして、ポンプユニット８は、図４に示すように、カプセルＫを投薬器本体２のカプセル収容穴３に挿入した後、カプセル押え９のカプセル押圧部９Ｄを投薬器本体２のカプセル収容穴３内に挿入し、おねじ部２Ｂとめねじ部９Ｃとを螺着することにより、当該鼻腔用投薬器１を形成する。なお、カプセル収容穴３内のカプセルＫは、カプセル押圧部９Ｄにより軸方向に若干押圧した状態で保持されている。

【００３９】１８はカプセル収容室３内に収容されたカプセルＫに穴をあけるための穴あけ具を示し、該穴あけ具１８は、ガイド筒部２Ｄ内に可動に支持された支持部１９と、基端側が該支持部１９に固着され、先端が鋭利な針先２０Ａとなって各ピン挿通穴６Ｂ，７Ａに挿入さ

れたピン２０，２０と、前記支持部１９と投薬器本体２との間に設けられた戻しばね２１とから構成され、該戻しばね２１は、カプセルＫの穴あけ後に各ピン２０の針先２０Ａが僅かにピン挿通穴６Ｂ，７Ａに進入した状態となる初期位置まで支持部１９と各ピン２０を戻すものである。

【００４０】そして、穴あけ具１８は、支持部１９を戻しばね２１に抗してガイド筒部２Ｄ内に押込んで各ピン２０をピン挿通穴６Ｂ，７Ａに挿通させることにより、その針先２０Ａをカプセル収容穴３内のカプセルＫに貫通させ、該カプセルＫの軸方向両端側の離間した位置に径方向に貫通する４個の貫通穴Ｈ（図６参照）をあけるようになっている。また、支持部１９の押圧力を取除くと、戻しばね２１の付勢力によって支持部１９、各ピン２０が初期位置まで後退する。

【００４１】さらに、２２は投薬器本体２に設けられたカプセル排出具で、該カプセル排出具２２は、カプセル収容穴３内に軸方向に移動可能に挿入された円板状の排出板２２Ａと、該排出板２２Ａから径方向に突出して長穴２Ｅ，２Ｅに挿通した一対の突出部２２Ｂ，２２Ｂと、該突出部２２Ｂの先端側に連結され、投薬器本体２の矩形部２Ｃの長手方向をなす両側面に位置した操作部２２Ｃとから構成されている。そして、図５に示すように、投薬動作を終了した後に、投薬器本体２とポンプユニット８とを外し、カプセル排出具２２の操作部２２Ｃを軸方向一側（矢示ａ方向）に移動させることにより、排出板２２Ａはカプセル収容穴３内を一側に移動する。そして、この排出板２２Ａの移動に伴ってカプセルＫをカプセル収容穴３から排除する。

【００４２】本実施例による鼻腔用投薬器１は上述の如き構成を有するもので、次に、その使用動作について説明する。

【００４３】最初に、鼻腔用投薬器１内にカプセルＫを収容し、このカプセルＫに４個の貫通穴Ｈをあけるまでの準備動作について説明する。

【００４４】まず、図４に示す如く、カプセルＫを投薬器本体２のカプセル収容穴３内に一側から挿入した上で、カプセル押え９のカプセル押圧部９Ｄをカプセル収容穴３内に一側から挿入し、おねじ部２Ｂとめねじ部９Ｃとを螺着して、投薬器本体２にポンプユニット８を連結する。これにより、カプセル収容穴３内に収容されるカプセルＫは、カプセル押え９のカプセル押圧部９Ｄにより軸方向に若干押圧した状態で収容される。

【００４５】そして、穴あけ具１８を構成する支持部１９をガイド筒部２Ｄに沿って押込むことにより、該支持部１９に固着された各ピン２０をピン挿通穴６Ｂ，７Ａに沿って挿入し、該各ピン２０の針先２０Ａによってカプセル収容穴３内に収容されたカプセルＫの径方向に、該カプセルＫの軸方向に離間した径方向両側の４箇所に貫通穴Ｈ，Ｈ，…を穿設する。また、カプセルＫに各貫

通穴Ｈを穿設した後には、支持部１９、各ピン２０は戻しばね２１の付勢力によって初期位置まで戻される。

【００４６】次に、患者が薬粉を投与するときの鼻腔用投薬器１内の空気の流れと薬粉の流れについて説明する。

【００４７】まず、患者は、投薬器本体２の噴出ノズル４，４を左，右の鼻腔にそれぞれ挿入し、図６に示すように、ポンプ部１６の押圧部１６Ｃを矢示Ｐ方向に押圧する。これにより、供給弁１０の弁体１２は開弁し、ポンプ部１６から吐出される空気は、ポンプ側通路１４、オリフィス１３、本体側通路１５、各流入側通気路を介してカプセル収容穴３に向けて供給される。

【００４８】このとき、ポンプ部１６からの空気は、カプセルＫ内を挿通した上で、各流出側通気路７のピン挿通穴７Ａ、流出通路７Ｂ、薬粉噴出口５を介して患者の鼻腔に流れる。このとき、カプセル収容穴３の径方向側方から流入する空気によって、該カプセルＫ内の薬粉は拡散され、この薬粉は空気と共に患者の鼻腔に搬送される。

【００４９】ここで、前記流入側通気路６，６と流出側通気路７，７とは、カプセル収容穴３に対して径方向に離間した状態で、投薬器本体２の軸方向に延びるように一対ずつ形成され、各流入側通気路６のピン挿通穴６Ｂは互いに対向するように径方向に形成されているから、各流入側通気路６のピン挿通穴６Ｂからカプセル内に流入される流入空気は、カプセルＫ内でそれぞれ衝突して乱流を発生させることができ、該カプセルＫ内の薬粉を空気中に効率よく拡散することができる。

【００５０】また、各流出側通気路７のピン挿通穴７Ａも、カプセル収容穴３に対して互いに対向するように径方向に形成されているから、カプセルＫ内から流出する空気が軸方向に薬粉噴出口５，５に向けてストレートに流れるのを防止し、流出側の貫通穴Ｈ近傍でもカプセルＫ内の薬粉の拡散性を高めることができる。

【００５１】即ち、本実施例では、各流入側通気路６のピン挿通穴６Ｂはカプセル収容穴３に対して径方向側方に対向するように形成されているから、カプセルＫ内に貫通穴Ｈを介して流入する空気は、カプセルＫ内で衝突して乱流を発生するようになっている。このため、超微粒化した薬粉を用いた場合でも、カプセルＫ内の薬粉を効率よく流入空気中に拡散することができ、カプセルＫ内の薬粉を各流出側通気路７、薬粉噴出口５を介して患者の鼻腔に確実に投与することができる。

【００５２】この結果、本実施例の鼻腔用投薬器１は、カプセルＫ内に流入する空気により該カプセルＫ内に乱流を発生させ、この乱流によってカプセルＫ内の薬粉を空気中に拡散させた上で、薬粉を含む空気を患者の鼻腔に搬送することができ、カプセルＫ内に残る薬粉の量をきわめて少なくすることができ、投与量のバラツキをなくすことができる。

【００５３】さらに、カプセルＫに流入される空気は、ポンプ部１６から流入側通気路６との間に位置した各オリフィス１３を介して流入されるから、該各オリフィス１３の穴径によってカプセルＫ内に流入される空気流量を規制することができる。この結果、カプセルＫ内に充填された薬粉が、比重が軽く、粒径も小さい超微粒化したものであるときには、該オリフィス１３の穴径を小さくして流入空気流量を少なくすることにより、該カプセルＫ内の拡散性をより高めることができる。

【００５４】ここで、図７と図８に基づいてオリフィス１３によって、空気の流れを絞った場合にカプセルＫ内に充填された薬粉と空気の流れについて説明する。

【００５５】まず、超微粒化した薬粉が充填されたカプセルＫを用いた場合には、流入される空気の流速は、この薬粉によって減速されてカプセル内の空気の淀み部をなくして、カプセルＫ内の薬粉を確実に搬送することができる。

【００５６】一方、図８に示すように、流入側の各貫通穴ＨからカプセルＫ内に流入される空気は、互いに衝突して乱流を発生して流入側の貫通穴Ｈから流出側の貫通穴Ｈに向けて流れる。このとき、オリフィス１３によって空気の流れが絞られ、空気の流速が遅くなるため、空気流はカプセルＫの端部まで流込み、空気の淀み部は形成されない。

【００５７】このため、小径なオリフィス１３を有するカプセル押え９を取付けた鼻腔用投薬器１に、超微粒化した薬粉を充填したカプセルＫを用いた場合には、この微粒化した薬粉は、空気の流速を減速することなく、カプセルＫ内に形成された乱流によって空気中に効率よく拡散することができる。そして、カプセルＫ内の薬粉は、この空気流によって確実に搬送できる。

【００５８】このように、本実施例による鼻腔用投薬器１では、カプセル収容穴３に対して径方向に離間した状態で、投薬器本体２の軸方向に延びる流入側通気路６，６と流出側通気路７，７とをそれぞれ形成したから、カプセルＫに各流入側通気路６を介して流入される空気の流れを径方向側方から流入するようにし、該カプセルＫ内で流入する空気は衝突して乱流を発生することができる。

【００５９】しかも、この流入空気流量は、投薬器本体２の上流側に位置したカプセル押え９に形成されたオリフィス１３の穴径によって規制されているから、超微粒化した薬粉の場合には、当該オリフィス１３の穴径を小さくすることにより、流入空気流量を絞ってカプセルＫ内に隅々まで乱流を行き届けさせ、この乱流によってカプセルＫ内の薬粉を確実に搬送できる。そして、カプセルＫ内に残存する薬粉をなくすことができ投薬効率を高めることができる。

【００６０】なお、薬粉が比重が重く、粒径の大きい薬粉の場合には、図９に示すようにオリフィス１３′のように穴径を大きくすることにより、カプセル内に流入される流入空気は貫通穴から勢いよく流入される。このとき、粒径の大きな薬粉は、流入される空気の速度を減速し、カプセル内に発生する淀み部をなくしてカプセルＫ内の薬粉を確実に搬送することができる。

【００６１】かくして、本実施例では、カプセル収容穴の径方向に一対の流入側通気路６，６と流出側通気路通気路７，７とを形成したから、カプセルＫの径方向から流入される空気流は、カプセルＫ内に乱流を発生せしめ、この乱流で空気中に薬粉を効率よく拡散し、患者の鼻腔に向けてカプセルＫ内の薬粉を搬送できる。

【００６２】しかも、カプセルＫ内に流入される空気流量は、投薬器本体２の上流側に位置して形成されたオリフィス１３の穴径によって規制することができ、カプセルＫ内に充填された薬粉の物性によって選択的にカプセル押え９または９′を選ぶことにより、カプセルＫ内に発生する空気の淀み部をなくすことができる。この結果、投薬動作終了後にカプセルＫ内に残存する薬粉の量は、大幅に低減することができ、患者への薬粉の投与量のバラツキをなくすことができる。

【００６３】次に、図１０に本発明による第２の実施例を示すに、本実施例の特徴は、カプセル押えの形状を変えて、カプセル収容穴３に供給される空気流量を規制する空気流量規制手段を径方向に形成したオリフィスから構成したことにある。なお、本実施例では、前述した第１の実施例と同一の構成要素に同一の符号を付し、その説明を省略するものとする。

【００６４】図中、３１は本実施例によるカプセル押えを示し、該カプセル押え３１は第１の実施例で述べたカプセル押え９の代わりに用いられ、該カプセル押え３１は、中央部に開口穴３１Ａ１を有する円板部３１Ａと、該円板部３１Ａの外周側に位置して他側に延びるように形成された短尺な筒部３１Ｂと、該筒部３１Ｂの内周面に形成されためねじ部３１Ｃと、前記円板部３１Ａの中心部から軸方向他側に延びるように形成され、供給弁１０の弁体１２の移動を規制する弁体規制突起３１Ｄと、前記円板部３１Ａの中心部から軸方向他側に向けて円板状に突出した凸部３１Ｅとからなり、前記円板部３１Ａの中央部には一側に開口する後述のカプセル押圧棒３２を保持する保持穴３１Ｆが形成されると共に、前記円板部３１Ａの開口穴３１Ａ１にはテーパ面部３１Ｇが形成されている。

【００６５】３２はカプセル押圧棒を示し、該カプセル押圧棒３２は一側が小径部３２Ａとなり、他側が大径部３２Ｂとなり、前記小径部３２Ａの先端には保持穴３１Ｆに挿嵌される保持部３２Ｃが形成されている。

【００６６】３３，３３は本実施例による流入空気量規制手段をなすオリフィスを示し、該各オリフィス３３は前記凸部３１Ｅの径方向に穿設され、開口穴３１Ａ１と供給弁１０側とを連通させるようになっている。

【００６７】なお、前記円板部３１Ａの他側には前述した弁体収容部１１、弁体１２からなる供給弁１０が固着されている。

【００６８】このように構成される本実施例によるカプセル押え３１においても、前述した第１の実施例と同様に、カプセル押え３１にポンプ部１６を固定してポンプユニット８を形成し、このポンプユニット８と投薬器本体２とで第１の実施例による鼻腔用投薬器を構成する。

【００６９】この鼻腔用投薬器は、前述した第１の実施例と同様の作用効果を得ることができ、カプセルＫに対して径方向から空気を流入させて、カプセルＫ内の薬粉を効率よく拡散させることができる。さらに、カプセル内の薬粉の物性に対応させてオリフィス３３の穴径を設定することにより、カプセル内の薬粉を患者の鼻腔に確実に搬送することができ、投薬効率を高めることができる。

【００７０】さらに、図１１に第３の実施例を示すに、本実施例の特徴は、投薬器本体に設けた穴あけ具をカプセルの両側にそれぞれ配設したことにある。なお、本実施例では前述した第１の実施例と同一の構成要素に同一の符号を付し、その説明を省略するものとする。

【００７１】図中、４１は本実施例による投薬器本体を示し、該投薬器本体４１の外形は前述した投薬器本体２と同様に構成され、軸方向一側で短尺な円筒状に形成された大径部４１Ａと、該大径部４１Ａの外周面に形成されたおねじ部４１Ｂと、前記大径部４１Ａから他側に向けて断面が長方形状をなすように広幅部と狭幅部から形成された矩形部４１Ｃと、該矩形部４１Ｃの狭幅部に延びて突設され、後述する各穴あけ具４７の支持部４８を可動に支持するガイド筒部４１Ｄ，４１Ｄと、前記矩形部４１Ｃにカプセル排出具５１を軸方向に移動させるために、カプセル収容穴４２に貫通して形成された長穴４１Ｅ（一方のみ図示）とから構成されている。

【００７２】４２はカプセル収容穴を示し、該カプセル収容穴４２は前記投薬器本体４１の中央部から一側に位置したポンプユニット８側に開口するように有底穴として形成されている。また、該カプセル挿入穴４２内に、ポンプユニット８のカプセル押圧部９Ｄを一側から挿入することにより、カプセル収容室を構成している。

【００７３】４３，４３は噴出ノズルで、該各噴出ノズル４３は前記投薬器本体４１の矩形部４１Ｃの他端面に位置して離間した状態で突設され、該各噴出ノズル４３内の軸方向には、後述の流出通路４６Ｂ，４６Ｂの開口部となる薬粉噴出口４４，４４が形成されている。

【００７４】４５，４５は投薬器本体２の一側に設けられた２本の流入側通気路を示し、該各入側通気路４５は、カプセル収容穴４２の径方向の外周側に位置してポンプユニット８側に開口するように投薬器本体４１の軸方向側方に形成された流入通路４５Ａ，４５Ａと、該各流入通路４５Ａと連通しカプセル収容穴４２に開口するように径方向に形成されたピン挿通穴４５Ｂ，４５Ｂとから構成されている。そして、各流入側通気路４５はポンプ部１６から供給される空気をカプセル収容穴４２の径方向側方から供給するようになっている。

【００７５】４６，４６は投薬器本体４１の他側に設けられた２本の流出側通気路を示し、該各流出側通気路４６は、カプセル収容穴４２に開口するように径方向側方に形成されたピン挿通穴４６Ａ，４６Ａと、該各ピン挿通穴４６Ａと連通し、前記カプセル収容穴４２の径方向の外周側に位置して前記薬粉噴出口４４に向けて拡径した状態で形成された軸方向通路としての流出通路４６Ｂ，４６Ｂとから構成されている。そして、各流出側通気路４６はカプセル収容室４２の径方向側方と各薬粉噴出口４４とをそれぞれ連通している。

【００７６】４７，４７はカプセル収容室４２内に収容されたカプセル（図示せず）に左，右から穴をあけるための穴あけ具を示し、該各穴あけ具４７は、各ガイド筒部４１Ｄ内に可動に支持された支持部４８と、基端側が該支持部４８に固着され、先端が鋭利な針先４９Ａとなって各ピン挿通穴４５Ｂ，４６Ａに挿入されたピン４９，４９と、前記支持部４８と投薬器本体４１との間に設けられた戻しばね５０とから構成され、該各戻しばね５０は、カプセルの穴あけ後に各ピン４９の針先４９Ａが僅かにピン挿通穴４５Ｂ，４６Ａに進入した状態となる初期位置まで支持部４８と各ピン４９を戻すものである。

【００７７】そして、各穴あけ具４７は、支持部４８を戻しばね５０に抗してガイド筒部４１Ｄ内に押込んで各ピン４９をピン挿通穴４５Ｂ，４６Ａに挿通させることにより、その針先４９Ａをカプセル収容穴４２内のカプセルに貫通させ、４個の貫通穴（図示せず）をあけるようになっている。また、支持部４８の押圧力を取除くと、戻しばね５０の付勢力によって支持部４８、各ピン４９が初期位置まで後退する。

【００７８】さらに、５１は投薬器本体４１に設けられたカプセル排出具である。

【００７９】このように構成される鼻腔用投薬器においても、前述した第１の実施例と同様の作用効果を得ることができ、カプセルに対して径方向から空気を流入させて、カプセル内の薬粉を効率よく拡散させることができる。さらに、カプセル内の薬粉の物性に対応させてオリフィス１３の穴径を設定して流入空気流用を規制することにより、カプセル内の薬粉を患者の鼻腔に確実に搬送することができ、投薬効率を高めることができる。

【００８０】なお、前記各実施例では、カプセル収容穴３（４２）内に薬粉が充填されたカプセルＫを収容する構成としたが、これに替えて、例えば、投薬器本体に薬粉収容室を設け、該薬粉収容室に薬粉を直接充填し、この薬粉を噴出する構成としてもよい。

【００８１】

【発明の効果】以上詳述した如く、請求項１の本発明によれば、ポンプ部から供給される空気は、各流入側通気路により薬粉収容室の径方向側方から流入し、該薬粉収容室内で衝突して乱流を発生する。そして、薬粉収容室内の薬粉は、この空気流によって空気中に拡散して混合され、この薬粉を含んだ空気は、各流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出でき、投与量のバラツキをなくすことができる。

【００８２】請求項２の発明によれば、ポンプ部から供給される空気は、各流入側通気路によりカプセル収容室の径方向側方から流入し、該カプセル収容室内で衝突して乱流を発生する。そして、カプセル収容室に収容されたカプセル内の薬粉は、この空気流によって空気中に拡散して混合され、この薬粉を含んだ空気は、流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出できる。

【００８３】請求項３の発明によれば、ポンプ部から供給される空気は、各流入側通気路により薬粉収容室の径方向側方から流入し、該薬粉収容室内で衝突して乱流を発生する。そして、薬粉収容室内の薬粉は、この空気流によって空気中に拡散して混合され、この薬粉を含んだ空気は、流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出できる。また、ポンプ部から各流入側通気路を介して薬粉収容室内に供給される空気流量は、オリフィスによって規制されているから、薬粉の粒径、比重、流動性等の物性に応じて、オリフィス径を変えて流入空気流量を加減することにより、薬粉収容室内の薬粉を流入空気に効率よく拡散することができ、薬粉収容室内に残る薬粉の量をきわめて少なくして、投与量のバラツキをなくすことができる。

【００８４】請求項４の発明によれば、ポンプ部から供給される空気は、各流入側通気路によりカプセル収容室の径方向側方から流入し、該カプセル収容室内で衝突して乱流を発生する。そして、カプセル収容室に収容されたカプセル内の薬粉は、この空気流によって空気中に拡散して混合され、この薬粉を含んだ空気は、流出側通気路を介して薬粉噴出口から患者の鼻腔に向けて噴出できる。また、ポンプ部から各流入側通気路を介して薬粉収容室内に供給される空気流量は、オリフィスによって規制されているから、薬粉の粒径、比重、流動性等の物性に応じて、オリフィス径を変えて流入空気流量を加減することにより、薬粉収容室内の薬粉を流入空気に効率よく拡散できる。

【００８５】請求項５の発明では、カプセルの穴あけ時に用いるピン挿通穴を、流入側通気路と流出側通気路の一部とし、該各ピン挿通穴をカプセル収容室に対して径方向側方に位置させて形成しているから、カプセルに穿設される貫通穴を径方向に対向させて形成することができる。また、各流入側通気路を介してカプセル内に流入する空気はカプセル内で衝突し、該カプセル内に乱流を

発生させ、薬粉を効率よく空気中に拡散させることができる。そして、カプセル内の空気は、各流出側通気路のピン挿通穴、軸方向通路、薬粉噴出口を介して鼻腔に流れるから、この空気流により、薬粉を搬送することができる。

【００８６】請求項６の発明では、ポンプ部から供給される空気は、各流入側通気路、薬粉収容室またはカプセル収容室、各流出側通気路、薬粉噴出口を介して鼻腔に流れ、この空気流によって、薬粉収容室またはカプセル収容室内の薬粉を鼻腔に搬送することができる。

【図面の簡単な説明】

【図１】第１の実施例による鼻腔用投薬器の斜視図である。

【図２】第１の実施例による鼻腔用投薬器の縦断面図である。

【図３】図２中の鼻腔用投薬器のポンプユニットのみを示す縦断面図である。

【図４】鼻腔用投薬器にカプセルを挿入する前の状態を示す分解断面図である。

【図５】カプセルを投薬器本体から取除く状態を示す縦断面図である。

【図６】第１の実施例による鼻腔用投薬器の投薬動作を示す縦断面図である。

【図７】オリフィスを有するカプセル押えの縦断面図である。

【図８】図７のカプセル押えを用いたときの、カプセル内の空気の流れを示す説明図である。

【図９】オリフィスの穴径を大きくした場合のカプセル押えの縦断面図である。

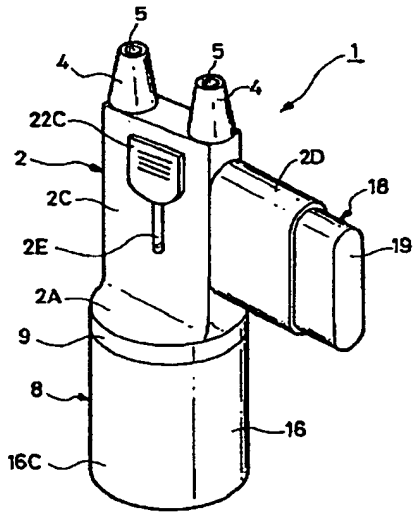
【図１０】第２の実施例によるカプセル押えを示す縦断面図である。

【図１１】第３の実施例による鼻腔用投薬器の縦断面図である。

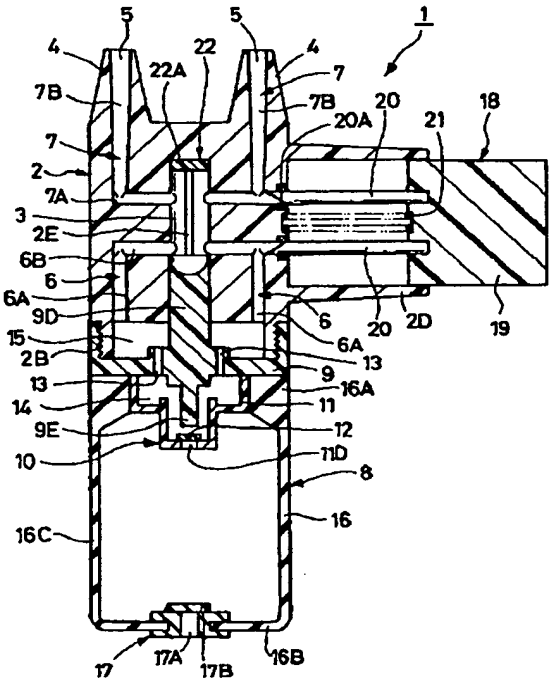
【符号の説明】

１　鼻腔用投薬器
２，４１　投薬器本体
３，４２　カプセル収容穴（薬粉収容室）
４，４３　噴出ノズル
５，４４　薬粉噴出口
６，４５　流入側通気路
６Ａ，４５Ａ　流入通路
６Ｂ，７Ｂ，４５Ｂ，４６Ａ　ピン挿通穴
７，４６　流出側通気路
７Ａ，４６Ｂ　流出通路（軸方向通路）
８　ポンプユニット
１３，３３　オリフィス
１６　ポンプ部
１８，４７　穴あけ具
２０，４９　ピン

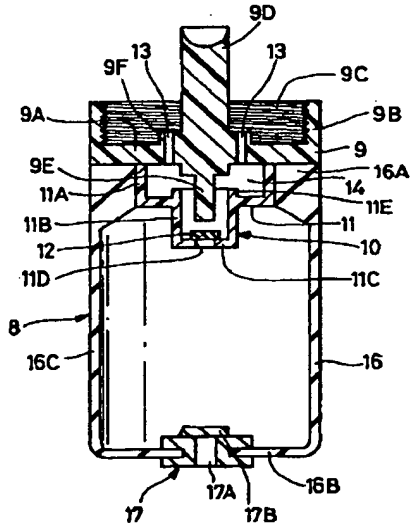
【図１】


5
4
5
4
1
22C
2
2D
18
2C
19
2E
2A
9
8
16
16C

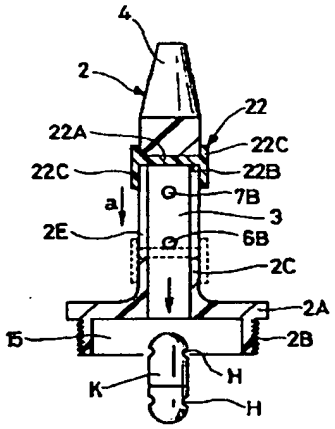
【図２】


5
5
1
4
22A
22
4
7
7B
7B
20
20A
21
18
7
2
7A
3
2E
6B
6
6A
9D
6
20
2D
19
15
6A
2B
13
13
9
16A
14
11
9E
12
10
11D
8
16C
16
17
17A
17B
16B

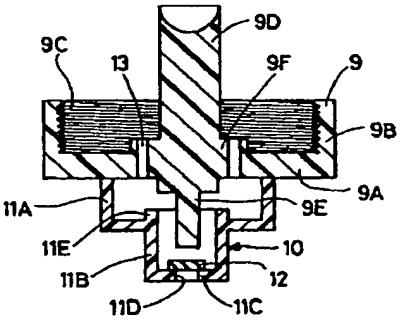
【図３】


9D
9F
13
13
9C
9A
9B
9
9E
16A
11A
14
11E
11B
11
12
10
11D
11C
8
16C
16
17
17A
17B
16B

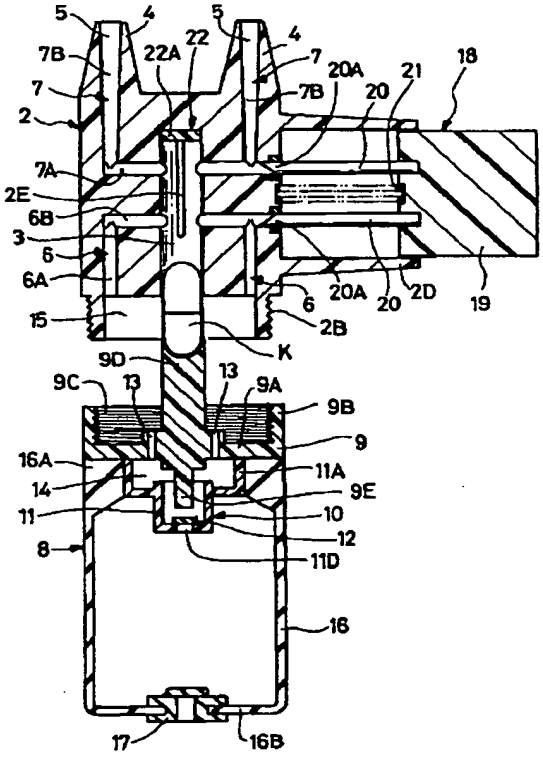
【図５】


4
2
22
22A
22C
22C
22B
G
7B
a
3
2E
6B
2C
2A
15
2B
H
K
H

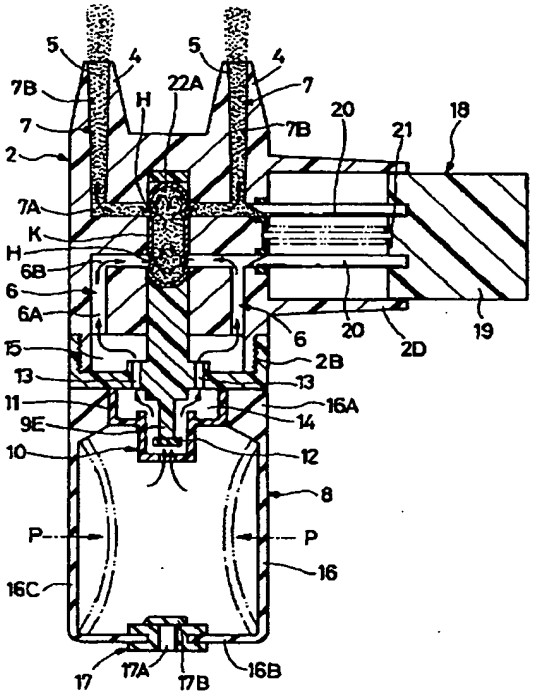
【図７】


9D
9C
13
9F
9
9B
9A
11A
9E
11E
10
11B
12
11D
11C

【図４】



【図６】



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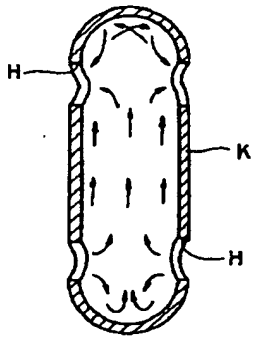

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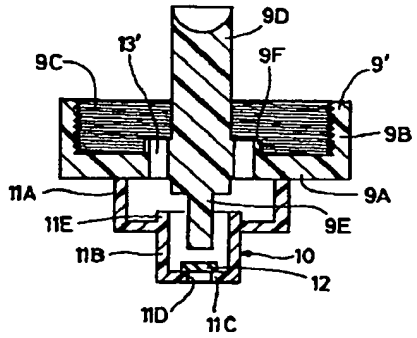

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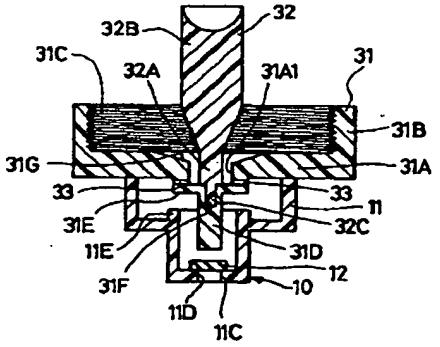
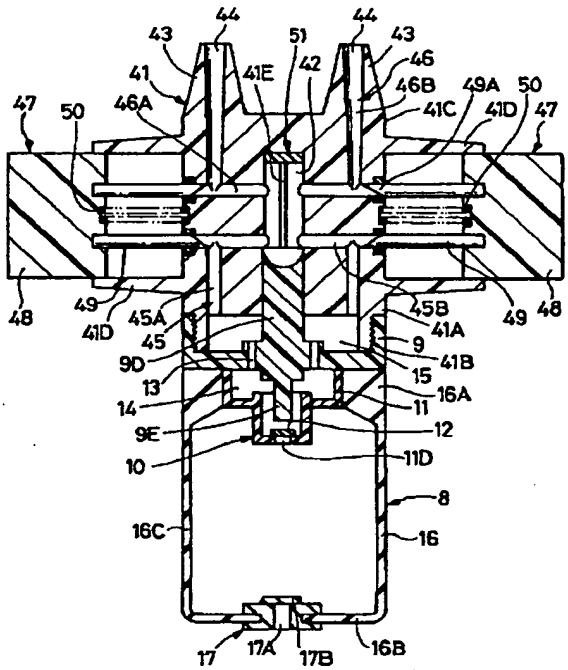


【図１１】



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